REMARKS

This Amendment is responsive to the Office Action mailed September 3, 2009, in which claims 1–3, 5–12, 14–16, 18–20 and 26–32 were rejected. (Office Action, pp. 1, 3.) With this Amendment, claims 1, 2, 9, 10, 16 and 19 are amended. Claims 1–3, 5–12, 14–16, 18–20 and 26–32 remain pending in the application, and are presented for reconsideration and allowance.

On page 2 of the Office Action, an informality objection is made to claim 1, with specific reference to consistency of terms as recited in lines 2 and 5. (Office Action, p. 2.) Following Examiners' suggestion, claim 1 is amended to recite "the front end of the beam component" in line 5, as consistent with "the rear end of the beam component" in line 2. With this amendment, the informality objection to claim 1 is overcome.

On page 3 of the Office Action, claims 1–3, 5–12, 14–16, 18–20 and 26–32 are rejected as unpatentable (obvious) over Arya et al., U.S. Patent No. 6,785,094 (Arya), in view of Sutton et al., U.S. Patent No. 5,965,249 (Sutton) and in further view of Takagi et al., U.S. Pub. No. 2001/0008475 (Takgai), Appl. No. 09/793,410, abandoned.

Claims 1, 2, 9, 10, 16 and 19 are amended to point out that the recited moduli of elasticity and damping capacity of the claimed structural damping materials are in a vibration mode having a frequency between about 6,000 hertz and about 22,650 hertz, which amendments introduce no new matter under 37 C.F.R. § 1.121(f). (See Application, TABLE 1 (disclosing bending, torsion and sway modes with frequencies between 6,010 hertz and 22,650 hertz); p. 8, ll. 18–23 (effectiveness of the invention at least partially attributable to concentration of strain energy and damping properties "in major suspension resonance modes"); p. 12, ll. 7–12 (preferred moduli of elasticity and damping capacities "in the vibration mode of concern" or "a vibration mode of concern"); see also FIGS. 3, 4; p. 17, ll. 2–19 (simulation results "in accordance with the present invention" for vibrations in "bending mode or torsion mode" and "sway mode," over the range of vibration mode frequencies disclosed in TABLE 1).) See also ¶¶ 2, 5, 14, 15, 22, 26, 27 (discussing relationship of mode frequency to properties of invention as claimed).

With respect to the rejections under 35 U.S.C. § 103(a), Sutton is relied upon for teaching the claimed elastic moduli and damping capacities. (Office Action, pp. 3–4.) With respect, however, Sutton does not teach a range of these properties that overlies or overlaps the claimed range, so there is no prima facie case of obviousness under 35 U.S.C. § 103(a). M.P.E.P. § 2144.05 (prima facie case of obviousness exists "where the claimed ranges 'overlap or lie inside ranges disclosed by the prior art'") (citing *In re Wertheim*, 541 F.2d 257 (C.C.P.A. 1976); *In re Woodruff*, 919 F.2d 1575 (Fed. Cir. 1990)).

More specifically, in addressing claims 1 and 16 the Office Action refers to Sutton's FIGS. 18 and 19. (Office Action, p. 4.) In FIG. 18, Sutton teaches materials with loss moduli of about 10–25 gigapascals ($1.0–2.5\times10^{11}$ dyne/cm^2), but Sutton does not teach that these materials have damping capacity greater than about 0.02. Instead, Sutton teaches "effective tan(δ)" of about 0.10 or less.

Applicants specifically point out that the claimed damping capacity is *not* tan(δ), as taught by Sutton, but is instead zeta (ζ), where $\zeta = \delta/2\pi$. (Specification, p. 12, ll. 22–27 ("Derived from logarithmic decrement δ is damping capacity $\zeta = \delta/2\pi$."). Sutton's effective tan(δ) range of about 0.10 or less thus corresponds to damping capacity ζ of about 0.016 or less, and this neither overlies nor overlaps a range of damping capacity greater than about 0.02, as claimed by Applicants. (Note that δ is defined in radians, such that the difference between claimed and prior art ranges is determined by inserting Sutton's effective tan(δ) into the exact expression $\zeta = \tan{-1}(\tan(\delta))/2\pi$. Alternatively, the small angle approximation $\tan(\delta) \approx \delta$ is accurate to less than half a percent in this range, giving $\zeta \approx \tan(\delta)/2\pi$.)

While a prima facie case of obviousness may also exist where the claimed and prior art ranges are "close enough," moreover (see M.P.E.P. § 2145.05), in the claimed frequency range of about 6,010 hertz to about 12,650 hertz (that is, $\log_{10}$ frequency between about 3.78 and about 4.10), Suttons' FIG. 19 teaches effective tan(δ) of about 0.06 or less (that is, damping capacity ζ of about 0.0095 or less). A person of ordinary skill in the art would *not* expect this material to have the same damping properties as a material with damping capacity ζ greater than about 0.02, as claimed by Applicants, because the claimed range is more than twice the prior art range.

Similarly, Sutton's FIGS. 20–21, 24–25, 28–29, 33–34 and 37–38 teach materials with elastic moduli of about 0.40 gigapascals (4.00×10^{9} dyne/cm^2) or less, which is more than an order of magnitude below the claimed range of greater than approximately 10 gigapascals. In FIGS. 22–23, 26–27, 31–32 and 35–36, Sutton teaches materials with loss moduli of up to about 35 gigapascals (3.5×10^{11} dyne/cm^2), but these materials have effective tan(δ) of about 0.10 or less in the recited frequency range, which neither overlies nor overlaps the claimed range of damping capacity, as described above.

In no case, therefore, does the prior art teach or suggest Applicants' invention as specified in base claims 1 and 16, nor the additional elastic and damping limitations recited in dependent claims 2, 9, 10 and 19, and these claims are nonobvious under 35 U.S.C. § 103(a). M.P.E.P. § 2143.03 (in judging obviousness, all claim limitations must be considered) (citing *In re Wilson*, 424 F.2d 1382, 1385 (C.C.P.A. 1970)). Claims 3, 5–8, 11, 12, 14, 15, 18, 20 and 26–32 are also nonobvious, for at least the reason that they depend from allowable base claims. *Id.* ("If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious.") (citing *In re Fine*, 837 F.2d 1071 (Fed. Cir. 1988)).

While Sutton teaches that materials can be "tailored to optimize damping performance" (Sutton, col. 15, ll. 6–9), moreover, Sutton does not in fact disclose materials with the claimed properties, merely that it might be possible to optimize these properties, and this is insufficient for obviousness under 35 U.S.C. § 103(a). See, e.g, M.P.E.P. § 2112(IV) (citing *In re Rijckaert*, 9 F.3d 1531, 1534 (Fed. Cir. 1993)) (reversed because inherency was based on *optimization of conditions, not what was necessarily present in the prior art*) (emphasis added). Sutton's teaching to optimization, in fact, merely invites investigation, and "an invitation to investigate is not an inherent disclosure." *Id.* (citing *Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings*, 370 F.3d 1354, 1367 (Fed. Cir. 2004)).

In any case, the mere fact that references *can* be combined or modified does not render the resultant combination obvious unless "*the results would have been predictable to one of ordinary skill in the art*." M.P.E.P. § 2143.01(III) (citing *K.S.R. Int'l Co. v. Teleflex Inc.*, 550 U.S. 398 (2007) (emphasis added). Here, while knowledge of fundamental material quantities is of value in predicting three-point bending performance, as taught by Sutton, "such testing is further removed from direct measurements," and "*the applicability of such methods to three point bending data for a composite system is less obvious*." Sutton, col. 21, ll. 18–25; col. 23, ll. 8–11 (emphasis added). Whereas the Office Action relies on Sutton's teaching of effective tan(δ) as obvious, moreover, "it is difficult," according to Sutton, "to rigorously define an exact time-temperature superposition for tan(δ)." Sutton, col. 23. ll. 29–30.

In fact, Sutton's "effective tan(δ)" approximation requires careful control of temperature and phase conditions, as applied to a steel beam/swatch configuration, none of which would be obviously applicable to Applicants' invention as claimed. See, e.g., Sutton, col. 23, ll. 16–53. Applicants, moreover, apply a finite element (FE) analysis to the claimed material properties. (Specification, p. 16, l. 6 – p. 17, l. 19.) FE analysis is a numerical technique for notoriously unpredictable problems like weather prediction, and to complex elasticity and structural analysis problems, as described herein, which are subject to numerical instabilities, complicated domain structures, and other unpredictable effects. See, e.g., WIKIPEDIA, Finite Element method, http://en.wikipedia.org/wiki/Finite_element_method (December 3, 2009; copy provided). Thus the proposed modifications of Sutton would not have been predictable under *KSR*, and applicants claims are not obvious under 35 U.S.C. § 103(a).

In each of independent claims 1 and 16, Applicants also point out that at least one of the hinge component and the gimbal component is separately made, and attached to the beam component. In rejecting these claims, the Office Action relies on Arya for teaching beam, hinge and gimbal components and Takagi for teaching "many advantages of making at least one of a hinge component and a gimbal component separately and attaching to a beam component" (Office Action, p. 7). Arya, however, teaches that the hinge and gimbal are *not* separately formed. To the contrary, Arya teaches that suspension 100 is formed with layers 36, 38 and 40 running continuously

("intact") through each of mount plate 102, hinge 108, beam 110 and gimbal 120. Arya, col. 6, ll. 33–35 ("this will leave the third through fifth layers 36–40 intact, with the third layer 36 acting as a load bearing member"); see also col. 6, l. 41 – col. 7, l. 35; FIGS. 6–8 (showing third through fifth layers 36, 38 and 40 formed continuously through mount plate 102, hinge 108, beam 110 and gimbal 120, without separation). Thus Arya teaches away from a separately formed hinge or gimbal components, as claimed by Applicant, and claims 1 and 16 are not obvious under 35 U.S.C. § 103(a). See, e.g., M.P.E.P. § 2141.02(VI) (prior art reference must be considered as a whole, "including portions that would lead away from the claimed invention.") (citing *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540 (Fed. Cir. 1983)).

In addition, whereas Takagi teaches that spring member (hinge) 41 and flexure 50 are attached to load beam 31 by "laser welding or the like," Arya teaches a substantially *weld free* suspension assembly. Compare, e.g., Takagi, ¶¶ 6, 44, 46, 53 (hinge/spring elements 41, 42 and flexure 50 are fixed to base plate 30, load beam 31 and rigid body portion 40 "by laser welding or the like"); to Arya, col. 2, ll. 26–28 ("What would be particularly desirable is a suspension that is substantially, if not completely, weld free in its construction."); see also Arya, col. 2, ll. 10–24 (disadvantages of welding include additional processing steps, thermal distortion, flatness variation, dynamic flutter).

Thus the suggested combination of Arya with Takagi is not obvious under 35 U.S.C. § 103(a), and claims 1 and 16 are allowable for at least this reason as well. M.P.E.P. § 2145(X)(D)(2) ("references cannot be combined where reference teaches away from their combination") (citing *In re Grasselli*, 713 F.2d 731, 743 (Fed. Cir. 1983)). Claims 2, 3, 5–12, 14, 15, 18–20 and 26–32 are also allowable, because they depend from nonobvious base claims 1 and 16, and based on the additional arguments and amendments herein.

On pages 8–14, the Office Action provides additional grounds for rejecting dependent claims 3, 5–8, 11, 12, 14, 15, 18, 20 and 26–32. These grounds for rejection are moot, because none of the prior art, whether alone or in combination, teaches or discloses the invention as claimed in base claims 1 and 16, and because the proposed combination of Arya with Takagi is not obvious under 35 U.S.C. § 103(a), as described above.

With this amendment, each of Applicants' pending claims 1–3, 5–12, 14–16, 18–20 and 26–32 is allowable, and notice to that effect is requested. The Commissioner is authorized to charge any additional fee required under 37 C.F.R. §§ 1.16 and 1.17, or to credit any overpayment, to Deposit Account No. 11-0982.

Respectfully submitted,

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